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ABSTRACT

With funds received under the Education Consolidation and Improvement Act (ECIA) Chapter 2, the Computer Discretionary Grant was designed to train Philadelphia (Pennsylvania) School District teachers in personal computer operations. Teams comprised of middle and junior high school teachers were allowed to enroll in the staff development program. Each team consisted of a science teacher and mathematics teacher from the same school. Twenty public and four non-public school teachers participated in the program. Funds were used to purchase software and pay leaders and teachers. Two-hour staff development sessions were conducted over a 15-week period at a computer laboratory housed in a high school. Teacher teams were expected to instruct classes after their training. Training sessions were rated highly by participants, but the teaching sequence was not implemented because school administrators were not able to complete their commitment. Nevertheless, teacher reactions indicate that mathematics and science teachers acquired the skills necessary to apply computer technology to the instructional process. Student progress objectives seemed to be too ambitious considering the time allotted. Future programs should be based on verified capabilities of participating schools and qualifications of participating teachers. Feasibility analyses, follow-up support, software disbursement records, and continued program evaluation should also be included in future program implementations. The Teacher Workshop Reaction Form, the ECIA Chapter 2 Science and Technology Grant Final Examination, and three data tables are provided. (TJH)

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Report #1186

THE COMPUTER DISCRETIONARY GRANT: AN EVALUATION

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THE SCHOOL DISTRICT OF PHILADELPHIA

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COMPUTER DISCRETIONARY GRANT (CDG)

PROJECT DESCRIPTION

The Computer Discretionary Grant (CDG) was designed to train teachers in personal computer operations. Teams made up of middle and junior high school teachers were allowed to enroll in the program. Each team included a science teacher and mathematics teacher from the same school. Funds were used to purchase software and pay leaders and teachers. Two hour staff development sessions were conducted at a computer laboratory housed in a high school over fifteen weeks. Teacher teams were expected to instruct classes after their training.

OBSERVED ACTIVITIES

A feasibility study was prepared prior to the start of the program and the evaluator found that CDG was congruent with the School District's needs. The teacher training strategy appeared to be feasible, but a question was raised by the evaluator regarding the amount of time students would work on the computers: In his opinion, the time frame might not be sufficient for students to complete the activities stated in the proposal. These activities included preparing graphs, working through a simulation and writing reports with word processing software. Sufficient time did not become an issue because this component of CDG was not implemented in the participating schools according to the requirement stated in the proposal.

Twenty-four teachers enrolled in the staff development program. Twenty teachers formed teams from ten public schools, five middle schools, four junior high schools and one K-8 elementary school. Four teachers represented nonpublic schools. Among the public schools represented, three had no computer laboratory set up, a requirement stated in the proposal and opportunity flyer. However, the schools represented in the program did own the number of microcomputers and printers specified by project eligibility documents.

Observations of the program's staff development component revealed that the teachers approached their tasks eagerly, cooperated with their partners and with others in the program, and worked through their exercises on schedule. The leaders, an instructional systems analyst from Computer Science Technology, a supervisor from Mathematics Education and a supervisor from Science Education, were motivated, responded to questions quickly and thoroughly, and were well versed in computer operations.

Most of the teachers who enrolled in the program had limited experience with computers at the training sessions' start. While some participants appeared to know certain basic computer operations and others could identify the components of a system, computer, monitor, keyboard, and disc drive, several teachers were unable to turn on the computer. The instructors recognized this problem and started the program by demonstrating the basic skills required to operate computers. Teachers who possessed these skills prior to the program's start or acquired them while enrolled in the program were willing to help their

fellow teachers learn the necessary techniques. By the end of the program, all of the teachers were able to work with the system as they ran word processing and graphics programs as well as the simulation used in the training sessions. The acquisition of the skills required to operate the computer system by all of the teachers who enrolled in the program demonstrates the value of the training sessions and attests to the leaders' concerns and interest.

When asked to comment on their training experience, the teachers were positive toward the instructors, the free software programs, learning how to integrate programs, and the concrete activities. As to negative aspects, the workshop's slow pace and the lack of sufficient Apple computers in their schools were cited by three teachers.

The evaluator scheduled eight classroom observations. Seven of the eight were completed but one was not completed because of a scheduling problem in the school. In the completed observations, none were designed to meet the standard set in the proposal where a sequence of ten forty-five minute classes was supposed to be scheduled. In one setting, a teacher team worked with a group of fifteen children for forty-five minutes once a week. However, this class met after the school day. Thus, meeting at times other than during the school day may be the most practical way to meet this requirement.

At least two students were assigned to each computer in each class observed. Naturally the more students working on a computer, the less hands-on experience will result for each one. Yet, students working cooperatively may help each other learn.

ATTAINMENT OF GOALS AND OBJECTIVES

Goals:

1. A core group of nearly forty teachers will be prepared to utilize computer-based simulations as an inquiry-based, guided discovery learning process in mathematics and science.

   Twenty-four teachers enrolled in the program. This goal was not attained.

2. Those teachers shall demonstrate the ability to graphically represent data extrapolated from simulations using computer-based graphics software.

   This goal was attained. Observations revealed that teachers were able to represent data through graphs.

3. The teachers will be able to synthesize the discoveries resultant from the simulation and the graphically represented data into a final report utilizing a word processor.

   This goal was attained. Teachers were able to prepare reports with word processing software.

4. The teachers will use the skills learned in microcomputer laboratories with their pupils during the project year.

   This goal was partially attained. Instruction using computers did take place in seven schools but three schools were not equipped with computer laboratories.

5. The participating pupils' science skills will be enhanced and upgraded through the use of computerized simulations. Mathematics skills will be enriched with packages for graphically representing data. Writing and recording skills will be improved as students use word processing software to produce their reports.

   No student reports were prepared nor was information on mathematics skills presented. Therefore, this goal was not attained.

Objectives:

1. To provide a teacher workshop on the use of computer-based instructional simulations for teaching an integrated mathematics/science instructional unit that will be rated as interesting, relevant and useful by the participants. It is expected that the participants' median rating of the workshops will be 3.0 or higher on a 5 point Likert Scale.

   Both parts of this objective were achieved. The workshop was provided and the participants' median ratings exceeded 3.0 on each Likert Scale item. These data appear in Table 1.

2. To train participating teachers in the skills needed for operating a computer-based simulation for teaching an integrated mathematics/science unit, to the extent that at least 90% of the participants who attend the 30 hour workshop will attain 90% mastery on an end-of-training test developed by an evaluator and the trainers.

   This objective was not achieved. Four of 24 teachers who completed the test achieved 90% mastery. These data appear in Table 2.

3. Participating teachers will implement a computer-based simulation for teaching an integrated mathematics/science unit characterized by:

   (A) The presence of a microcomputer laboratory that contains at least one system for every two children and two printers.

   This objective was not attained. Six of the ten schools which provided mathematics/science teacher teams were visited. Of the six, five had at least two printers. The number of computers ranged from six to sixteen. When instruction was

taking place, the number of students assigned to a computer ranged from two to six.

(B) Software that will enable instructional simulation, graphics generation, and word processing.

This objective was partially attained. Money for purchasing software packages was included in the grant. These software packages were given to the teachers for use in their schools. According to the project administrator, the workshop leaders reported that each teacher received the type and amount of software specified in the proposal. However, records were not maintained on software distribution. Therefore, it is not possible to ascertain if each school received its proper share of software packages.

(C) Displays that identify objectives to be met, reports to be generated and operating instructions for functioning within the environment.

This objective was not attained. None of the schools which were visited had displays.

(D) Participating pupils will use the computer systems to develop reports that are, on the average, rated as positive in terms of criteria that encompass the approaches and skills that are to be developed through the project. The final reports will be rated by the teacher according to the students' demonstration of:

(1) Understanding of community attitudes about the topic, (2) using conflict resolution strategies to generate solutions, (3) identifying and influencing variables, (4) investigating scientific guidance in making decisions, (5) presenting thoughts sequentially, and (6) using standard English and correct grammar.

Student reports were not prepared because this component of the program was not implemented.

(E) Participating pupils will react favorably to the use of computer simulation units. It is expected that at least 85% of the pupils will rate the unit as meaningful, informative, interesting and enjoyable as measured by a pupil questionnaire. The median rating will be 2.0 or higher on a 3 point Likert Scale.

This objective was attained. Sixty-two pupils responded to the instrument. All were positive toward the program. These data appear in Table 3.

IMPACT

The training component of CDG was successful; teachers learned how to operate personal computers and run common software packages on them. Teachers constructed graphs, used the word processing materials to prepare reports and worked through a simulation. Most of the teachers who enrolled in the workshop had little or no knowledge of computer operations at its start. By the workshop's end, they were able to use the machines properly.

The classroom implementation phase was not successful because the events specified in the proposal did not occur: There were no instances where a series of ten forty-five minute lessons was scheduled, a shortcoming attributed to the individual school administrators according to the program administrator.

Despite the school administrators' failure to adhere to the condition specified in the proposal, the teachers in the program did take steps to lead their classes in computer activities. It is to their credit that teachers used their newly-acquired skills to provide this educational opportunity for their students. Participants gave up free periods, switched classrooms and led after school classes in their attempts to provide computer instruction.

In summary, three objectives were set for CDG. Two objectives concerned the training sessions. Both of these objectives were attained. The third objective focused on classroom implementation and was made up of five sections. Two of the sections were achieved and three were not.

Recommendations

1. Although training slots were available for 40 teachers, only 24 enrolled in the program. Eligible teachers may not have been made aware of the opportunity by their principals and could not apply for the openings. On the other hand, the School District has 38 junior high and middle schools and 26% of these schools were represented, certainly a good representation of the eligible schools.

2. Observations revealed that some participants' skills in operating personal computers were clearly superior to those of other participants. While some differences in entry level skills must be anticipated among the members of any entering group in any area, great differences may limit a workshop's effectiveness because slots may be given to teachers who do not need basic instruction. To resolve problems of this type in future workshops, concurrent programs at different difficulty levels could be planned.

3. Documentation relative to the program specified that eligible schools must own seven microcomputers and two printers. Seven of the ten public schools had this equipment ready for use either prior to the program's start or during the instructional

phase. The remaining schools had this equipment on hand, but it was not available for student use during the implementation phase. Thus, students could not take part in the learning experiences specified in the project eligibility documents. To avoid situations of this type in the future, adherence to the stated requirements ought to be ascertained prior to the project's start.

4. Project records should be maintained on the disbursement of software packages to the schools. With this information on hand, Computer Science Technology personnel could plan programs and distribute software packages to the schools in line with their needs.

5. During each observation, the participating teachers were asked if they had been visited or contacted by representatives of the Computer Science and Technology Office, the Mathematics Education Office or the Science Education Office. Each teacher replied 'no.' The program leaders were contacted after the program terminated and asked if they had made any visits. The mathematics supervisor reported she made three visits, one with the Director of Mathematics Education, but the other leaders said they made no visits. Thus, communication between the program's leaders and the participating teachers was limited. Increasing the communication level through a planned series of classroom visits could provide valuable information for program administrators in terms of adjusting or verifying their staff development activities.

6. One condition stated in the proposal called for school administrators to assign teachers and their classes to their school's computer laboratory for ten forty-five minute sessions if they wanted their school's mathematics-science teacher team to join the staff development program. This commitment was not fulfilled in any of the schools which participated in the activity, a shortcoming which precluded achievement of the student-based goals and objectives. This state of affairs could be resolved in future activities by specifying controls designed to insure compliance or dropping such conditions because of difficulties in scheduling classes and teachers to laboratories. Setting up classes prior and subsequent to the school day could also act as a solution to this problem.

7. The instrument used to measure teacher performance was not subjected to extensive procedures for establishing reliability or validity. This limitation may have been responsible for the small number of teachers reaching 90% mastery on the test, a finding which was contradicted by the researcher's observations showing that the teachers knew how to operate the machines and run the software packages.

SUMMARY

CDG was made up of two components: a series of training sessions and a teaching sequence. The training sessions were implemented and rated highly by by the participating teachers, but the teaching sequence was not implemented because school administrators were not able to complete their commitment. In addition, the student progress objectives seemed to be too ambitious for the program to meet in the stated time span. The project did fulfill its Statement of Purpose as cited in the proposal; mathematics and science teachers acquired the skills necessary to apply computer technology to the instructional process. This finding is supported by the teachers' reactions to CDG which appear in Table 1. The information appearing in Table 2, examination results, appears to contradict this finding. However, the instrument used to measure the attainment of this objective may have been lacking in reliability and validity.

For future programs of this type, planners and administrators should verify the capability of the schools which and qualifications of the teachers who want to participate, ascertain the feasibility of the program's expectations, provide follow-up support, observe the programs after teacher training and maintain records of their software package disbursements. Attending to these details could result in a program which could act as a model for other school districts.

Table 1

Summary Of The Responses To The Teacher Workshop Reaction Form

Item	Median
1. The agreement between the announced objectives of the workshop and what was actually taught.	4
2. The degree to which the objectives of the workshop were clarified and discussed with the participants.	4
3. Suitability of the method or techniques by which the subject matter of the workshop was presented to the participants.	4
5. Suitability of the size of the class to workshop activities	5
6. Suitability of the workshop facilities available for the course	5
7. Suitability of supplementary materials available for the course	4
8. The degree to which a systematic effort to relate the activities of the workshop to the aims of classroom instruction was accomplished	4
9. The degree to which the pacing of the pacing of the workshop was comfortable.	4
10. To what degree do you find the workshop to be	
A. Interesting	4
B. Relevant	4
C. Practical	4

The response scale ranged from 1 to 5 with 5 serving as the point representing the highest satisfaction level. All of the items received median ratings of 4 or 5. (The median is the point below which 50% of the respondents fall). Since the median exceeded the mid-point of the scale used to collect data, the respondents were positive toward their workshop.

School District of Philadelphia
Office of Planning, Research and Evaluation
Division of Federal Evaluation Resource Services

TEACHER WORKSHOP REACTION FORM

You have completed a workshop designed to help you use computer-based instructional simulations for teaching an integrated mathematics/science unit to your children. We hope, this workshop has been of value to you. In order to improve our delivery of this program next year, we need to have your evaluation of some of the aspects of this year's program. Please be candid; we need to know what you think of our workshop if we are to make it better.

Thank you for your cooperation.

Directions: Read each item carefully. Select the number from 1 to 5 which best describes your reaction to the item and circle it.

1. The agreement between the ANNOUNCED OBJECTIVES of the workshop and what was actually taught.

   Very Low _____ Very High
   1 2 3 4 5

2. The degree to which the objectives of the workshop were clarified and discussed with the participants.

   Very Low _____ Very High
   1 2 3 4 5

3. Suitability of the method or techniques by which the subject matter of the workshop was presented to the participants.

   Very Low _____ Very High
   1 2 3 4 5

4. The degree to which the content of the workshop was presented so that it was understandable by the participants.

   Very Low _____ Very High
   1 2 3 4 5

5. Suitability of the size of the class to workshop activities.

   Very Low _____ Very High
   1 2 3 4 5

6. Suitability of workshop facilities available for the course.

   Very Low _____ Very High
   1 2 3 4 5

7. Suitability of supplementary materials available for the course.

Very Low _____ Very High
1 2 3 4 5

8. The degree to which a systematic effort to relate the activities of the workshop to the aims of classroom instruction was accomplished.

Very Low _____ Very High
1 2 3 4 5

9. The degree to which the pacing of the workshop was comfortable.

Very Low _____ Very High
1 2 3 4 5

10. To what degree did you find the workshop to be:

A. Interesting Very Low _____ Very High
1 2 3 4 5

B. Relevant Very Low _____ Very High
1 2 3 4 5

C. Practical Very Low _____ Very High
1 2 3 4 5

Table 2

Test Results: Science And Technology Grant Final Examination

Score	Percent Correct	Number of Participants
8	47	1
9	53	2
10	50	4
11	65	4
12	71 (median)	4
13	76	2
15	88	3
16	94	3
17	100	1
		24

The median for this seventeen item test was twelve. Only one of the twenty-four teachers who responded to the test answered all of the items correctly. Three other teachers achieved mastery in excess of 90%.

ECIA CHAPTER 2
SCIENCE AND TECHNOLOGY GRANT
FINAL EXAMINATION

Part I - Graphing

1) Pie, line and bar are:

a) Three of the four graph types that PFS graph can generate
b) A law firm
c) Three graph types PFS graph can generate
d) A rock group

2) If one desires to observe a graph that is on a disk but not in memory one must use the following menu selection:

a) Display chart
b) Get/Remove chart
c) Get/Edit data
d) Print/plot

3) In order to input data for use in a chart one must use:

a) Define chart
b) Get/Remove chart
c) Display chart
d) Get/edit data

4) If you do not set Y Div the computer will automatically set Y Div at:

a) A multiple of the Y Min
b) Ten
c) A number higher than your greatest data number
d) One hundred

5) If Y Min and Y Max are left blank the computer will automatically set the scales:

a) From zero to one hundred
b) In a multiple of five
c) Regardless of your data
d) Based on the data values

6) The maximum number of divisions for a pie graph is:

a) Ten
b) Nine
c) Eight
d) Seven

7) One can mix:

a) All graph types
b) Line and pie graphs only
c) Pie and bar graphs only
d) Line and bar graphs only

Part II - Word Processing

8) While using the Bank Street Writer, before corrections can be made, one must:

a) Remove the disk
b) Turn off the machine
c) Use the return key to transfer to the Edit mode
d) Change from the write mode to the Edit mode

9) The major function of the ESC key is to:

a) Clear a program from memory
b) Switch from Write mode to Edit mode
c) Transfer from Edit mode to Transfer mode
d) Clear a program from disk

10) Before inserting a new, unused disk be sure to:

a) Turn off the computer
b) Clear the screen
c) Clear computer memory
d) Initialize that disk

11) Pre-programed software i.e. Bank Street Writer should not be inserted into a drive unit while:

a) the computer is on
b) the drive is in use
c) the monitor is not plugged in
d) the RAM memory of the computer is empty

12) The difference between the clear & delete functions of the Bank Street Writer is:

a) clear is used for both disks and computer memory
b) delete is used for both disks and computer memory
c) clear is used for disks & delete is used for computer memory
d) clear is used for computer memory & delete is used for disks

13) The function of the print-final option is to:

a) allow for spacing between lines
b) allow for pausing between pages
c) determine the number of characters per line
d) all of the above

14) If one desires to substitute efficiently a word or phrase of test for another, one would use:

a) Erase
b) Move/moveback
c) Get/retrieve
d) Replace

15) Which of the following is not found on a transfer menu?

a) Print-Draft
b) Clear
c) Erase
d) Save

16) Control-C permits you to format text while in the:

a) Edit mode
b) Transfer mode
c) Write mode
d) Graphic mode

PART III SIMULATIONS

17) The purpose of using a computer simulation is that it:

a) permits role playing of a situation not normally possible in a classroom
b) is always more meaningful than other forms of instruction
c) gives an endless number of choices
d) allows for student creativity

Table 3

Student Opinions of Their Computer Classes

Item	Median
1. I feel my computer work is	3
2. In my opinion, my computer classes are	2
3. The computer class is	3
4. I would describe the computer	3

Sixty-two students students completed this questionnaire. All of the respondents were positive toward their computer experience as shown bv the high medians.

To the Student:

Please help us evaluate your computer class. We would like to set up classes in other schools and your opinions will help us. Please complete the four sentences below. If you want to add some comments, write them on the bottom of the page or on the other side. You do not have to write your name.

1. I feel my computer work is

   (a) very meaningful (b) meaningful (c) not meaningful

2. In my opinion, my computer classes are

   (a) very informative (b) informative (c) not informative

3. The computer class is

   (a) very interesting (b) interesting (c) not interesting

4. I would describe the computer sessions as

   (a) very enjoyable (b) enjoyable (c) not enjoyable

COMMENTS: